

REMARKS/ARGUMENTS

Claims 1-4, 6, 9 and 11-13 are pending in the application. Claims 1-4, 6, 9 and 11-13 were rejected. Applicants, by this paper, amend claims 1-4, 6 and 9. No new matter is added by amendment. Applicants respectfully request reconsideration and allowance of all pending claims.

Rejections Under 35 U.S.C. §102

Claims 1 and 6 were rejected under 35 U.S.C. §102 as being anticipated by Bardi et al. (US 7,173,979). Applicants contend that Bardi neither teaches nor suggests the invention recited in these claims, which have been amended to clarify the distinction between Bardi and the claimed invention. Furthermore, it would not be reasonable to conclude that one of ordinary skill in the art with knowledge of Bardi would come to the invention recited in these claims. Accordingly, Applicants traverse the Examiner's rejection of Claim 6 as being anticipated by Bardi and further contend that these claims are not obvious to those of ordinary skill in the art over Bardi taken together with any one or more of the other references cited by the Examiner.

The Examiner has indicated that Bardi discloses creating frequency diversity to overcome impairment caused by periodic nulls in multipath channels. Applicants contend that the term periodic and the term uniform are synonymous with respect the distribution of frequencies used to transmit channels of a system as disclosed by Bardi and also in a system as recited in the pending claims. Nonetheless, in order to ensure that there is no misunderstanding on the Examiner's part and thus expedite the long prosecution of this application, Applicants have amended the claims to recite providing a distribution of symbols redundantly applied to carriers, wherein the distribution of the carriers are selected such that the frequencies used to transmit the carriers are "non-uniform". This is made clear in the amended claims which state:

assigning redundant symbols, each such redundant symbol representing the same data bits of a message in the same way and modulating the redundant symbols onto a plurality of carriers to create a non-uniform carrier assignment....

In contrast, Bardi (at the paragraph that the Examiner directs applicant's attention) specifically states that:

it is preferred that information is transmitted not just twice, but, depending upon the channel, more than twice...The signal constellation diagram, which is shown in FIG. 1, or also in FIG. 2, permits the same information to be transmitted four times. Analogous to the case of double transmission, four transmission symbols will be generated, which are all based on the same information symbol, but which themselves are different from each other.

That is, Bardi is not representing the data with the same symbol multiple times and transmitting those multiple symbols on different non-uniform frequencies, but rather is using symbol diversity to modulate the same data on four different symbols and then transmit them uniformly distributed over the available frequency spectrum. Note that Bardi expressly states:

Preferably transmission symbols are transmitted which are all based on the same information symbols, so that they are uniformly distributed over the frequency raster, since then there is the greatest possibility of finding at least one channel which has not been damped to an exceptionally great extent through destructive interference.

This difference between the Bardi method of uniform distribution over the frequency raster and the presently claimed method and apparatus for non-uniformly distributing the data represented by the same symbol over the frequency raster is very significant because the need to modulate the same data in several different symbols is cumbersome and raises the complexity and cost of the transmitter. In the present invention, by recognizing that the problems are caused periodically, allows a more robust system even when the data is simply modulated in the same symbol redundantly. It should be noted that Bardi is clear in stating that the frequencies are uniformly distributed as shown by the example that Bardi gives of using the 32nd carrier, the 128th carrier and the 256th carriers, each being a multiple of 32 and thus period (i.e., uniformly distributed, as Bardi terms it).

Accordingly, Applicants have made clear this distinction by using the term that Bardi uses to refer to the particular distribution scheme to make clear that the distribution scheme of the presently claimed invention is the antithesis of what is disclosed by Bardi. Once again,

the distinction is clear in that Bardi uses different symbols to represent the same data on uniformly spaced carriers, while the claimed invention uses the same symbol to represent the same data redundantly and places these redundant symbols on non-uniformly spaced carriers.

In addition to the rejections noted above, the Examiner has also rejected Claims 1-3 as being anticipated by Joo, et al. (7,301,890). However, Joo suffers from the same deficiency from which Bardi suffers, namely that Joo teaches generating different symbols rather than repeating the same symbol. In addition, Joo teaches transmitting them over different antennas rather than on different frequencies, let alone on different frequencies selected to be non-uniformly spaced. This is completely different from the system recited in claims 1-3. That is, there is no teaching or suggestion or any other reason to conclude that one of ordinary skill in the art with knowledge of Joo would come to the present invention. In fact, Joo teaches away from the present invention by disclosing both the need for redundant transmissions over diversity antennas and also a scheme for generating different symbols from the same data. The Examiner specifically recites the language of Joo which teaches away from the invention claimed in the presently pending claims, that is "generating replica data by cyclically-circulating the input data" in order to generate several different symbols that are generated from the same data and which provide the same type of symbol diversity that is generated by Bardi, as noted above. Furthermore, the Examiner points to Joo's use of antenna diversity as teaching the spreading of redundant identical symbols over several non-uniformly distributed frequencies. Neither the concept of using the same symbol several times in an OFDM system nor the concept of spreading those symbols over carriers that are non-uniformly selected are disclosed in Joo. Accordingly, Applicants respectfully traverse the Examiner's rejections of Claims 1-3 and 6 as being anticipated under §102(a) or §102 (e).

Rejections under 35 USC §103

The Examiner rejected Claims 4, 9, 11-13, under 35 USC §103(e) as being unpatentable over Joo in view of Bardi, Tager, or Kleider, et al. Applicants note that Claims 4, 9, and 11-13 have the same elements as recited in Claims 1-3 and Claim 6, such as the transmission of data modulated using the same repeated symbol transmitted over frequencies selected to be non-uniformly distributed over the set of available OFDM carriers.

To establish a *prima facie* case of obviousness, the prior art reference, or references when combined, must provide all of the claim limitations and must establish that it would be obvious for one of ordinary skill in the art to combine the references in a way that would successfully result in the claimed invention.

Applicants contend that, in light of the amendments that have been made to the claims as now presented, a *prima facie* case of obviousness cannot be established and Applicants respectfully traverse the rejections. In particular, Applicants contend that the references, neither alone nor in combination, teach nor suggest all claimed features.

Accordingly, Applicants respectfully request reconsideration and allowance of Claims 1-4, 6, 9, and 11-13.

CONCLUSION

Applicants believe that all claims pending in the application are allowable. Applicants therefore respectfully request that a timely Notice of Allowance be issued in this case.

This is a response to the Office Action mailed on 12/12/07, and as such, is submitted together with a request for a three month extension of time and the fee required for such a three month extension of time.

If there are any other fees due in connection with the filing of the response, please charge the fees to our Deposit Account No. _____. If a fee is required for an extension of time under 37 CFR 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned.

Respectfully submitted,

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